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NATIONAL LABORATORY

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TA-53 Facility Management

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TA-53 Procedure

Blind Penetrations of Walls, Floors and Ceilings

53 FMP 106-05.0

Effective date: 1/21/97

APPROVALS

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1.0 Introduction

Walls, floors, ceilings, and other solid opaque surfaces can hide energized electrical circuits and other energetic hazards. Since personnel working at TA-53 often need to penetrate these surfaces to anchor equipment and reconfigure spaces for various experiments, there must be a process to investigate and analyze the potential hazards and then specify controls to reduce the risk of injury and/or property damage to an acceptable level.

Johnson Controls Inc.-World Services (JCI), the Laboratory's support services subcontractor, has utilized a "penetration permitting" procedure since February 1996. This procedure draws on that experience, ESH-5's subject matter experts, and applicable regulations, policies, and procedures (see Section 7).

2.0 Purpose

The purpose of this procedure is to provide assurance that appropriate hazards controlsare used for work involving the penetration of solid opaque surfaces by anyone working at TA-53 (FMU 61).

3.0 Scope

The procedure covers any activities in or on facilities/buildings at TA-53 conducted by any person at the facility, regardless of affiliation, wherever or whenever a solid opaque surface must be penetrated, and the existence or absence of an energized electrical circuit or any other energetic hazard beyond that surface cannot be physically verified. Work by JCI or other subcontractors who have a written surface penetration procedure of their own is not covered by this procedure, provided that their procedure has been included or referenced in the work package submitted to the Facility Management Team at the time the work is authorized.

4.0 Definitions

blind penetration — disturbance of a solid surface (breaking, drilling, sawing, cutting, or piercing) when what is beyond that surface cannot be physically seen, identified and verified as to location and the nature of the potential hazard.

work supervisor — individual who will be present at the work site and will be directly supervising or performing the proposed task/project.

5.0 Responsibilities

5.1 The Work Supervisor shall:

- obtain a TA-53 Facility Penetration Permit form (penetration permit) - Attachment A;
- analyze the task at hand (the penetration permit can assist you), consider the complexity of the task and the level of risk associated with it, then choose the appropriate procedural level (see Section 7):
- follow the procedural steps in Section 7;
- take the most conservative approach if questions or uncertainties concerning the task and its hazards cannot be clarified;
- contact facility management team members (eg. Building Manager, Plant Engineer, Safety Engineer, etc.), if additional assistance is needed;
- sign the penetration permit as the final approving authority after following this procedure to obtain the appropriate reviews, permits, and approvals. The signature covers the both the pre-work/planning stage of the project and the work phase. It certifies that:
  1. all authorizations, permits, reviews, and pre-work planning have been completed and that to the best of their knowledge and effort, the penetration can be completed without incident, injury, or property damage and
  2. the work will be conducted with strict adherence to permit provisions and other appropriate regulations, policies, and procedures.

5.2 The Supervisor of the Work Supervisor shall:

- review the work specified on the penetration permit;
- provide guidance and direction as needed (with particular attention to perceived technical and safety concerns);
- indicate by signature on the penetration permit that they:
  1. are authorizing the work specified on the penetration permit,
  2. have discussed technical and safety concerns with the work supervisor,
  3. are verifying that the work supervisor is fully capable and competent to accomplish the specified work.

5.3 The Building Manager shall:

- review the penetration permit (particularly the work process section);
- assist the work supervisor with the activity hazard analysis (AHA) by supplying knowledge of the area and researching available engineering

and as-built drawings;
- recommend actions and coordination that should be accomplished to ensure personnel safety, property protection, and minimal impact on facility operations;
- sign the penetration permit as the approving authority for the building and facility engineering. The signature indicates they:
  1. have reviewed the proposed work and work process,
  2. have discussed their technical and safety concerns with the work supervisor,
  3. have helped to locate and verify potential hazards (engineering drawings and local knowledge),
  4. believe the work can be accomplished without incident, injury, or property damage.

5.4 The Facility Safety Engineer/Staff shall:
- review the penetration permit (with particular attention to the AHA);
- ensure all applicable environmental, safety, and health (ES&H) regulations are considered and satisfied when applicable;
- ensure appropriate procedures are included in the work process;
- recommend improvements to the work process;
- assist the work supervisor by consulting and coordinating with ES&H specialists and other personnel as needed;
- sign the penetration permit. The signature indicates they have:
  1. reviewed the proposed work process and AHA and feel they adequately identify the potential hazards and provide for acceptable mitigation,
  2. discussed ES&H concerns and regulatory requirements, and then helped to ensure compliance with these requirements,
  3. confidence that the work can be accomplished without incident, injury, or property damage.

5.5 The Facility Manager or Alternate shall:
- provide a general review of Level 3 penetration permits for facility and configuration management issues;
- review Level 2 penetration permits upon the request of the work supervisor or the building manager;
- require or negotiate changes to the work to be performed as needed
- sign the penetration permit. The signature indicates they have:
  1. reviewed the proposed work for facility related conflicts and issues,
  2. discussed their concerns (facility, technical, and safety) with the work supervisor and/or their supervisor and initiated changes when

needed,

3. confidence that the work can be accomplished without incident, injury, property damage, or other adverse effects on the facility.

6.0 Precautions and Limitations

None.

7.0 Procedural Steps

7.1 Level 1

The Level 1 procedural steps are required for work that will be performed by TA-53 workers, including sub-contractors, in low hazard areas such as office buildings. Typical Level 1 activities include hanging pictures, mounting white boards, mounting or anchoring modular furniture or bookshelves, etc. Normally nails, screws, and "molly" or anchor bolts would be the primary fasteners. Level 1 could also be applied to light duty work in areas with greater hazards, but additional attention should be given to each step. The intent of the Level 1 procedure is to provide workers at TA-53 the opportunity to perform simple tasks without burdensome regulations and simultaneously increase the margin for safety for those same workers.

If You Want To	**Then you should**
hang, mount, anchor pictures, furniture, fixtures, equipment, etc. to hollow walls or to solid walls, floors, or other surfaces at a depth of 1 1/2" or less using hand tools or small power tools where no known or anticipated hazards exist	1. Think through the work process that is required to complete the task. Identify and eliminate or mitigate any potential hazards in the work area (while not required for Level 1 penetrations, the penetration permit may be useful as a guide). 2. Look over the surface to be penetrated and, to the extent possible, the other side of the surface. Plan to avoid penetrations above or below light switches and electrical outlets, near power panels, and near other potential hazards you have identified physically or through local knowledge (use existing holes when possible). 3. Contact the building manager for any assistance you may need and for access to a "stud finder" and/or a "tic tracer" when needed. 4. Lock-out/Tag-out the circuit breaker that services

	any circuit in the area you are working in as a good business practice. 5. Use only double-insulated tools, stand on a non-conductive surface, and use personal protective equipment (PPE) - Attachment D. 6. Execute the project. **WARNING:** *If you are uncomfortable with any safety aspect of the work/project then utilize the Level 2 process.*

7.2 Level 2

The Level 2 procedural steps are required for work that will be performed by TA-53 workers in any area where a significant depth of penetration is required (greater than 1 inch) and no soil will be disturbed. A typical Level 2 activity is setting "red-head" anchors for experimental equipment. The safety of this type of penetration is of the greatest concern to the Facility Management Team because it has traditionally been done without adequate hazard analysis, and is the primary reason that this procedure was written. The intent of the Level 2 procedure is to provide an opportunity for facility tenants (with the necessary skills and competence) to perform some time critical penetrations when the use of the JCI crafts or another contractor cannot meet scheduling demands. Level 2 penetration are allowed only when acceptable safety margins can be maintained. The ability of the FM Team and TA-53 line managers to keep the approval authority for Level 2 penetrations at the local level and the resultant safety will depend greatly on the thoroughness and judgment of the work supervisors.

If You Want To	Then You Must
anchor or mount equipment, fixtures, experiments, etc. (example "red-head anchors) to solid surfaces at a depth >1 1/2" or provide access through surfaces >1 1/2" thick using hand or small power tools	1. Obtain and fill-out a TA-53 Facility Penetration Permit (Attachment A), get supervisory approval (signature), & complete the following steps. 2. Outline the work process necessary to complete the task/project on the back of the permit. 3. Contact the building manager to inform him/her of the project, and obtain assistance in researching engineering drawings for hidden hazards and to obtain Facility Management engineering approval. 4. Complete an activity hazard analysis (AHA) on the back of the permit and get facility safety

	engineering approval (Attachment C). 5. Obtain the appropriate tools and required PPE to mitigate any identified or potential hazards (Attachment D). 6. De-energize all known or suspected energy sources (use TA-53 Lock-out/Tag-out Implementation Procedure). Verify that the source(s) are de-energized. 7. Execute the project. **WARNING:** *If any doubt exists concerning potential hazards (ie. existence or location), contact JCI Engineering Services at 5-0559 and arrange for a non-destructive examination (NDE) survey (requires a work order or small job ticket). The response time is about 2 days.*

7.3 Level 3

Level 3 procedures address larger projects and jobs that will require a LANL Excavation Permit. Level 3 is included in this procedure to reiterate the use of the steps established by Level 2, demonstrate how the procedures work together, and to ensure the completeness of this procedure. Level 3 procedures are required for penetrations that will be performed by Laboratory workers and sub-contractors without their own formal penetration procedure, where a depth of penetration greater than 1 inch is required and soil will be disturbed. Typical Level 3 activities include any construction, modification, maintenance, etc. of TA-53 facilities which involve digging or trenching. The intent of the Level 3 procedure is to combine the facility and Laboratory requirements, so that the facility is informed of all projects and maintains control of potential configuration conflicts. This should ensure acceptable safety margins, and with the exception of the LANL permit the approval authority was kept at the group and facility management team level to expedite the process. Once again the success of this procedure and the health and safety of TA-53 workers and residents, as well as visitors and users will depend greatly on the thoroughness and judgment of the work supervisors.

If You Want To	Then You Must
anchor or mount equipment, fixtures, experiments, etc. to solid surfaces at a depth >1 1/2" or provide access through these surfaces using hand tools, power tools, or heavy equipment and penetrating or disturbing the soil	1. Obtain and fill-out a TA-53 Facility Penetration Permit (Attachment A), get supervisory approval (signature), & complete the following steps. 2. Outline the work process necessary to complete the work/project on the back of the permit. 3. Complete an activity hazard analysis (AHA) on the back of the permit and get facility safety sign-off (see Attachment C). 4. Contact the building manager to inform him/her of the project and to obtain assistance in researching engineering drawings for hidden hazards, to provide needed coordination, and provide Facility engineering approval. 5. Submit the permit to the facility manager for a facility configuration management review and to obtain facility management approval. 6. Complete a LANL Excavation Information Form (Attachment B) and submit it along with a copy of the small job ticket, radiological and/or special work permit (if needed), and area map with the work location marked on it to begin the excavation permit approval process. 7. If any doubt exists concerning potential hazards (i.e. existence or location) or if a field survey is required as a condition of the excavation permit contact JCI Engineering Services at 5-0559 and arrange for the survey (requires a work order). The response time is about 2 days. 8. Obtain the appropriate tools and required PPE to mitigate electrical hazards and any other identified or potential hazards (Attachment D). 9. De-energize all known or suspected energy sources (use TA-53 Lock-out/Tag-out Implementation Procedure). Verify that all source(s) are de-energized. 10. Execute the project.

7.4 Training

7.4.1 All personnel who will act as work supervisors at TA-53 shall receive this procedure as self-study training. Group Leaders will provide the TA-53 Training Office with a list of probable work supervisors (personnel maybe added as needed). It is also advisable that Group Leaders, Team Leaders, and Project Leaders/Managers be aware of this procedure. Personnel will study the material then sign and return an attached sign-off sheet to the Training Office. Their signature indicates they have completed the training and received answers to any questions they may have had about the material. Questions about the procedure or other aspects of the process should be directed to the TA-53 training Office.

7.4.2 The Training Office will:

- request a list of work supervisor designees from each group leader with personnel working at TA-53;
- distribute the training material and sign-off sheets;
- answer questions concerning the material or refer those questions to the facility ES&H team;
- determine the appropriate interval for refresher training and schedule as needed; and
- maintain the appropriate training records.

7.4.3 The Facility Management Office will coordinate with FSS and BUS Division to ensure this information is provided to all contractors who enter TA-53 for the purpose of construction, repairs, or maintenance.

8.0 Records

8.1 Copies of each permit shall be maintained by the requesting group and the building manager.

8.2 Training records will be maintained by the TA-53 Training Office on the LANL Employee Development System (EDS).

9.0 References

29 CFR 1910.301

29 CFR 1926.401

Leon Kantola Memorandum addendum to Moratorium on Excavation/Penetrations, dated 25 January 1996

JCI, Health, Safety, and Environment Manual, Penetrating Ceiling, Wall, Floor, and Masonry Surfaces (#12-25-009, dated 7 Feb 96)

TA-53 Lock-Out/Tag-Out Implementation, 53FMP-106-04.1

10.0 Attachments

Attachment A	Sample TA-53 Facility Penetration Permit Form
Attachment B	Sample LANL Excavation Permit Form
Attachment C	Sample Activity Hazard Assessment
Attachment D	Typical Personal Protective Equipment (PPE) Requirements